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AUV うらしまおよび深海曳航式探査機を用いた精密磁気探査装置の性能評価
Evaluation of developed precise magnetic exploration tools with using the AUV Urashima and deep-tow systems

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We have developed new precise exploration tools for the seafloor hydrothermal deposits by magnetic method in order to estimate abundance of metallic resources (e.g. Sayanagi et al., 2009). Developed tools are assumed to be used with the underwater platforms such as deep-tow (DT) and autonomous underwater vehicle (AUV).

Since 2009, we have carried out several technical tests and performances by using the helicopter and research vessels. In this session, we introduce the results of the performance tests of following three research cruises.

1) Yokosuka YK09-09 Cruise (19-29 July, 2009; Kumano-Basin)

We carried out AUV Urashima and YKDT (Yokosuka Deep-Tow) dives in Kumano-nada (depth at 2,050m). To inspect the efficiency of equipments, we used a magnetic target which is consisted of 50 neodymium magnets. Four flux-gate (FG) and one Overhauser (OH) magnetometers were set up in the AUV and two FG and one OH magnetometers were used in the DT surveys (Harada et al., 2010a, 2010b). We could obtain the thee-component magnetic field and gyro data in the whole processes of AUV and DT experiments. After the effects of permanent and induced magnetization of platform were eliminated (Isezaki, 1986), magnetic anomaly generated from the magnetic target was clearly visualized.

2) Bosei-maru (Tokai Univ) Cruise (30 May - 05 Jun., 2010; Bayonnaise Knoll)

We carried out the DT survey in the inside and outside of Bayonnaise caldera (E139.75,N31.55). One FG sensor was set at the tail of the titan frame. The frame including the magnetic exploration system was towed by 50 m non-magnetized cable after the metallic wire along east-west track line at the depth between 500-550 m, which crosses just above the hydrothermal area known as Hakurei deposit.

3) Yokosuka YK10-17 Cruise (9-19 Dec., 2010; Bayonnaise Knoll)

We carried out the AUV (Urashima) surveys in the inside and outside of the Bayonnaise caldera. Three FG sensors were installed in the payload space of AUV, and one OH sensor was towed from the rear side of AUV by 25 m cable. In those dives, we used both optical fiber gyro set up in the payload space and INS (Inertial Navigation System) of AUV. The AUV was navigated at the altitude of some tens of meters and the depth of 500m to make three-dimensional models of hydrothermal deposit of Bayonnaise caldera.

From above cruises, we could understand the efficiency of our system, restrictions of navigation and their suitable operation, and the facts to be improved which are related to some kinds of noise components and combination of plural signals.

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